

Avian Influenza Preparedness



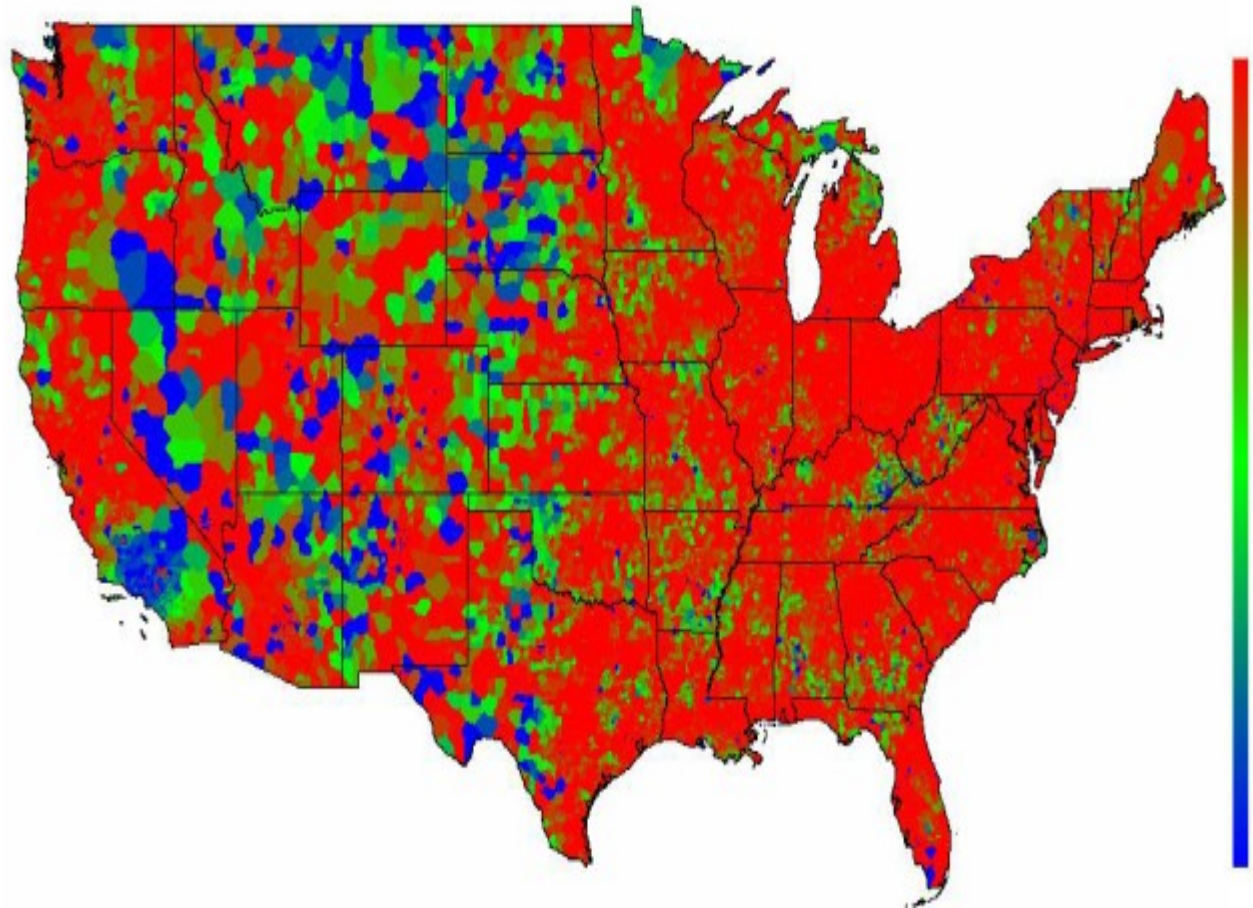
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**GEORGE MASON UNIVERSITY/NASA HQ
NASA ANNUAL OCCUPATIONAL HEALTH CONFERENCE
DENVER, COLORADO
JULY 25, 2007**

Overview

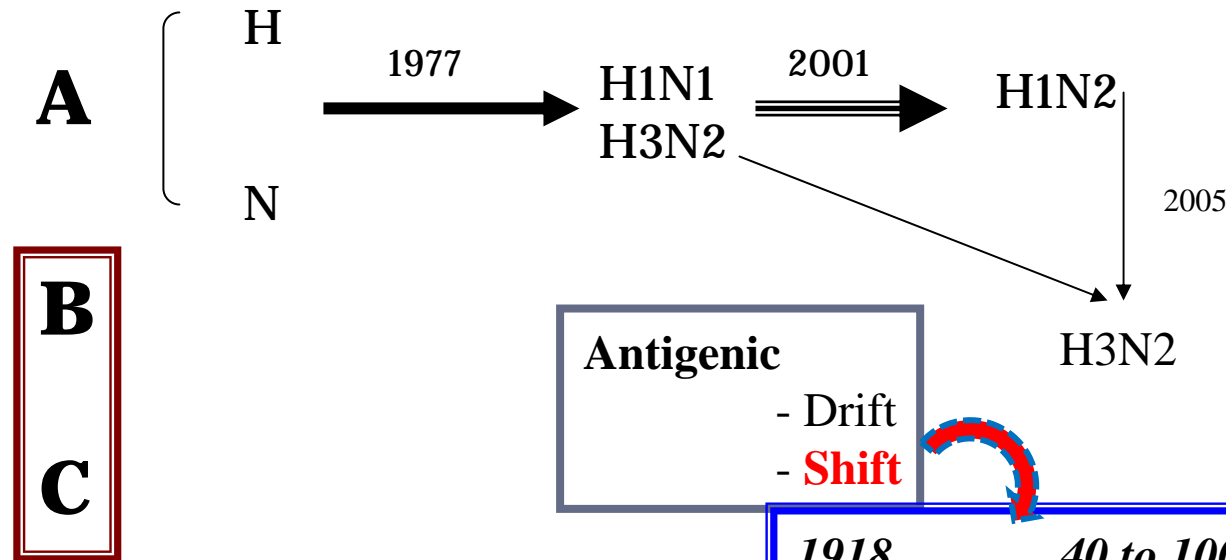
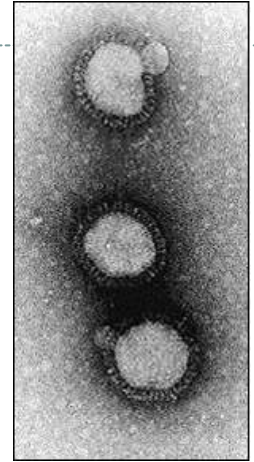
1. Background and historical perspectives
2. Current status
3. National goals & legislative framework
4. Preparations and planning process
5. Will it happen?
6. Policy Issues
6. Conclusions and the road ahead

Day 90



**Computer Model of the Avian Influenza
spread from UW and Fred Hutchinson
Cancer Center of Seattle**

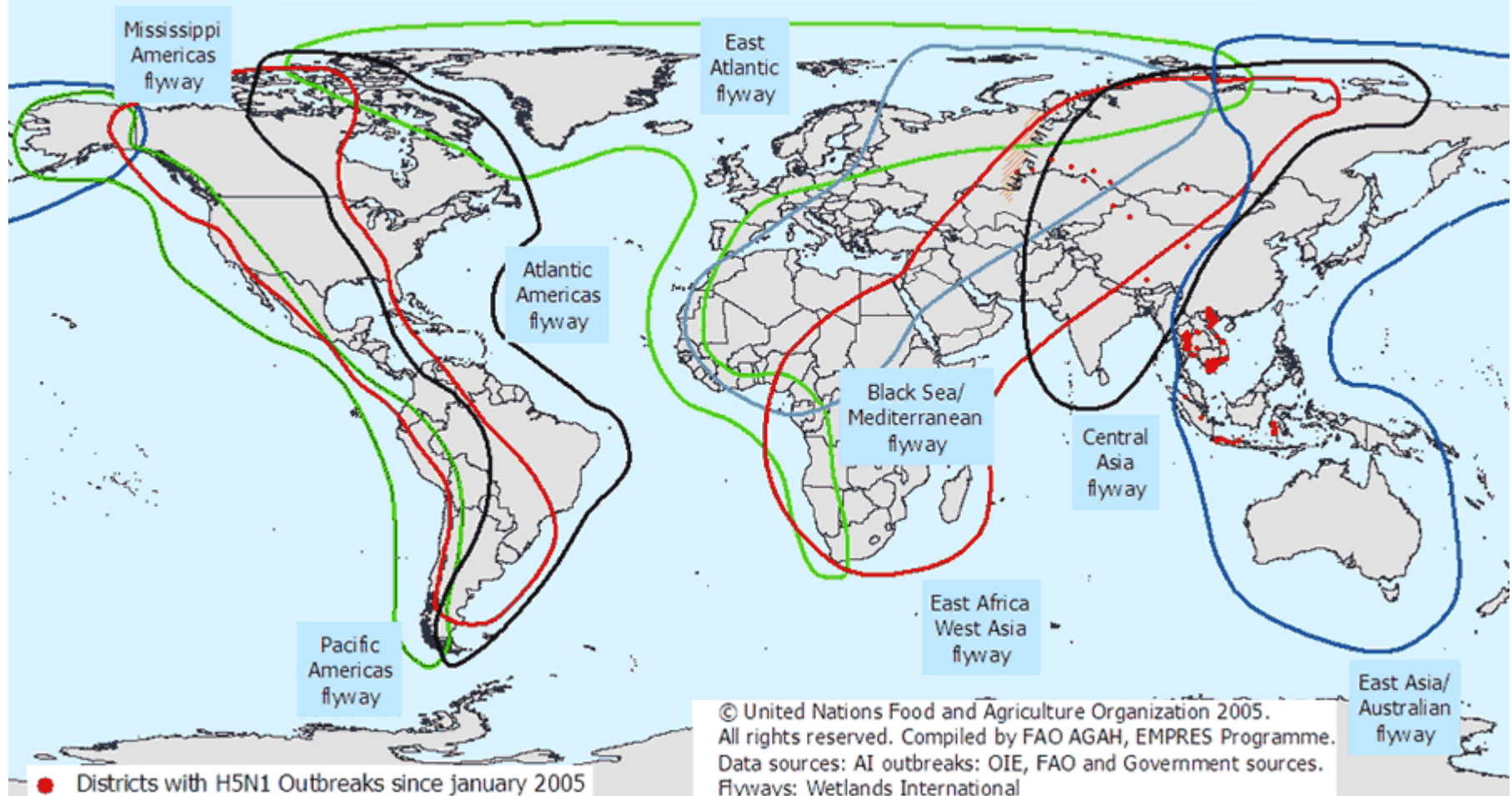
Influenza (*Influentia*)



1918.....40 to 100 Million Deaths
1957.....2 Million Deaths
1968.....2 to 7.4 Million Deaths
1997 H5N1 173 deaths (>70% fatality rate)
H5N1 estimates 1 Billion Deaths

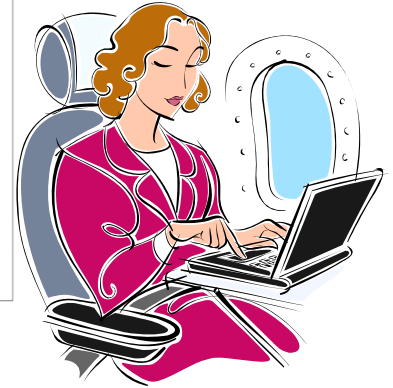
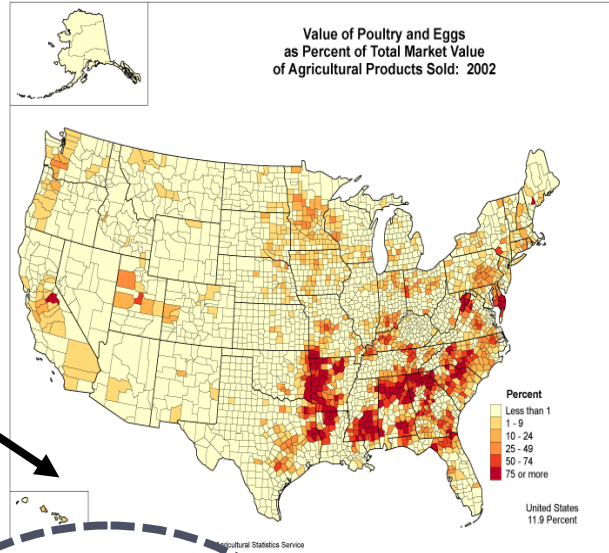
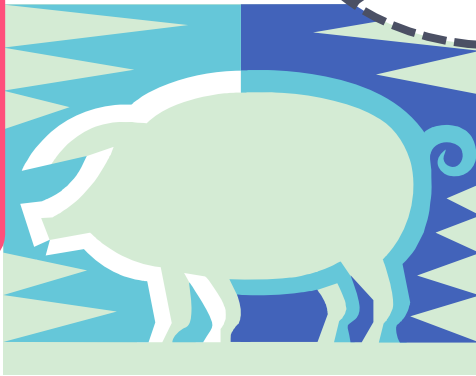
H5N1 outbreaks in 2005 and major flyways of migratory birds

Situation on 30 August 2005



Lakes as reservoirs

Viral Drift



Viral Shift



TRANSPORTATION-RELATED TRANSMISSION



- **Aircraft: Zoonotic disease**
 - Malaria: Loudoun County (2003)
 - Dengue fever
- **Aircraft: Airborne transmission**
 - Rhinovirus, influenza
 - TB
 - SARS (5 flights = probable)

... usually correlates with ≥ 8 hours air travel

Lancet 2005;365:989

TRANSPORTATION-RELATED TRANSMISSION of INFECTIONS



- **Aircraft**

- Fecal-oral most common

(1947-1999: 41 contaminated food-borne outbreaks with 11 deaths)

- Norwalk agent gastroenteritis among 30 passengers (2005)

- 1992: Cholera outbreak from Buenos Aires to LA; 75 infected/10 admissions/one death

- SARS in 2002-2003

- TB 1995 transmitted to 4 passengers

Lancet 2005;365:989

- **Trucks & rails**

- **POV**

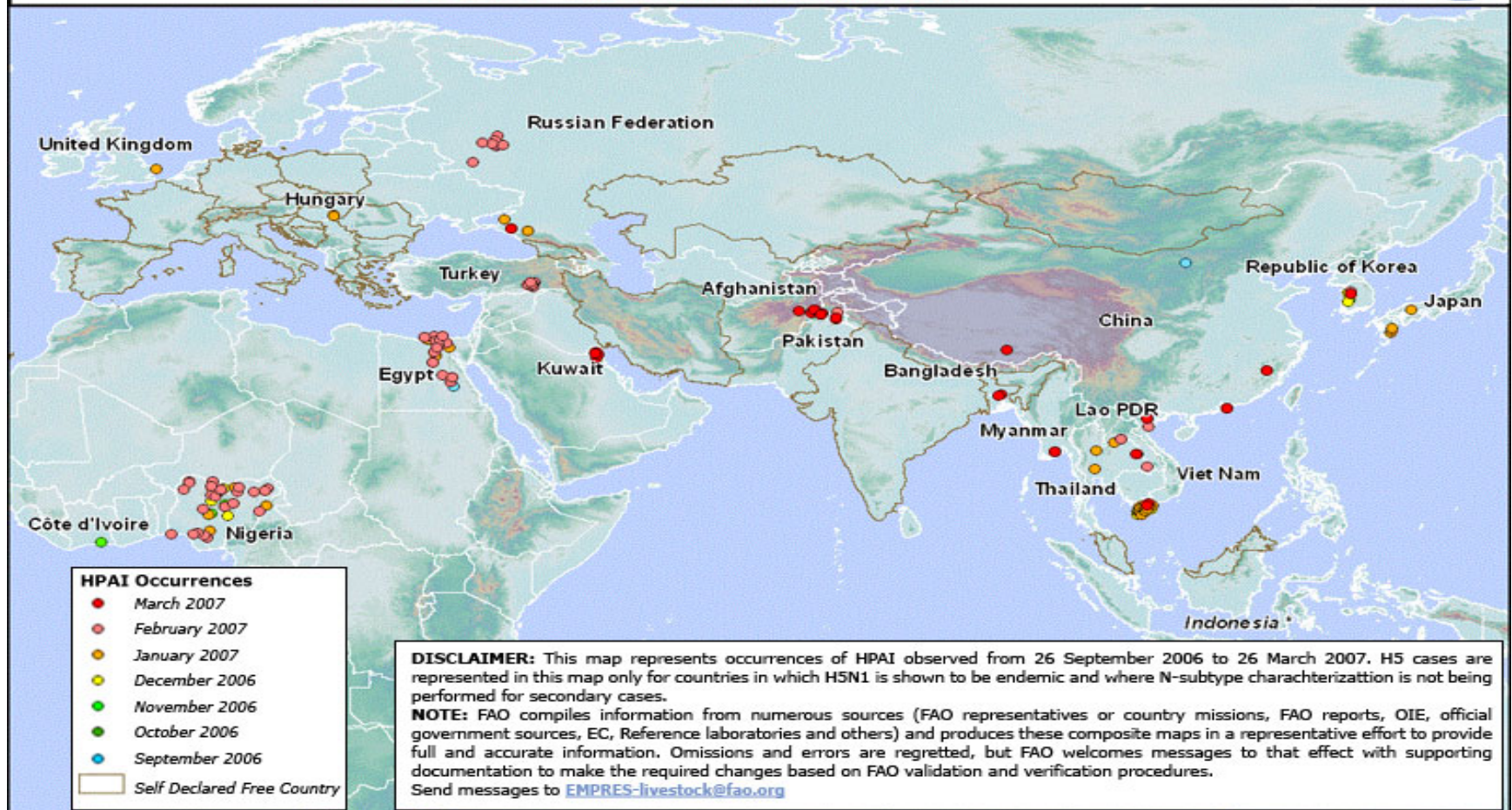
- **Cruise ships**

Current Status



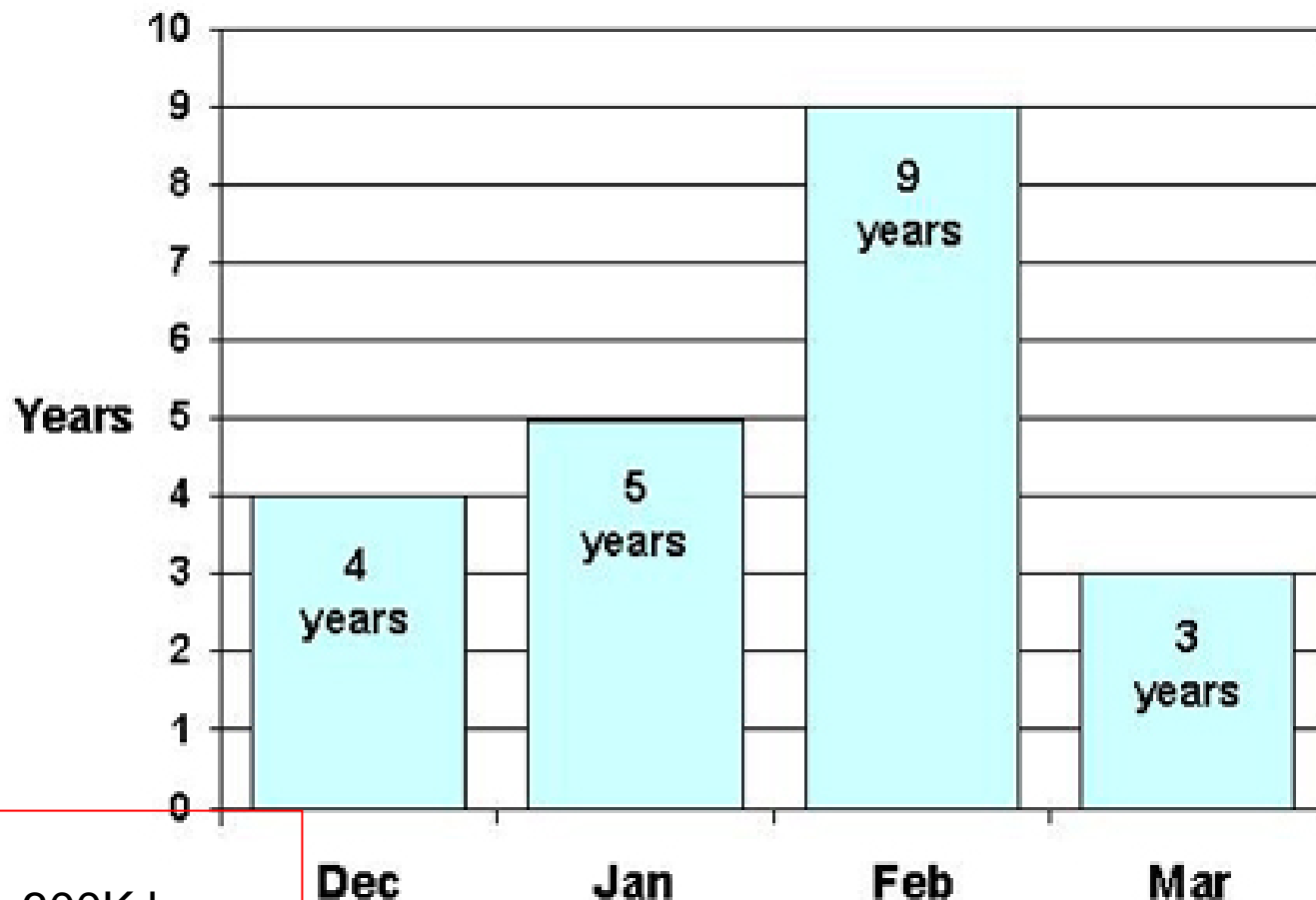
HPAI outbreaks: Outbreaks reported in poultry and cases in wild birds
26 September 2006 - 26 March 2007 (Six months period)

EMPRES
EMERGENCY PREVENTION SYSTEM



Peak Months for Flu Activity

Over the past 21 years



In U.S.:

- 200K to 300K hosp.
- 36K deaths

National Goals for Pandemic Preparedness



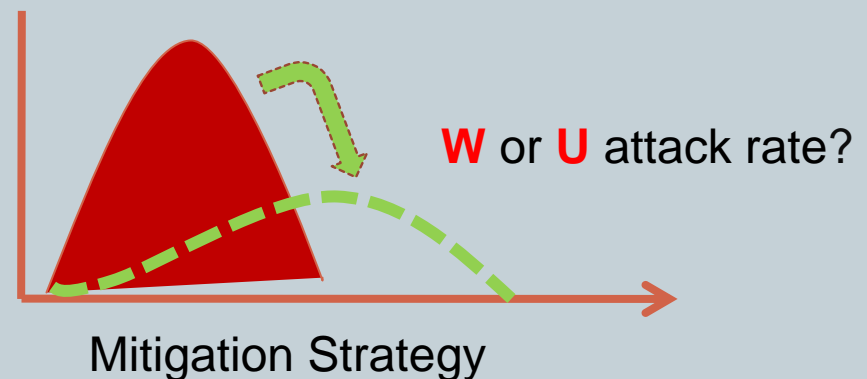
- 1) **STOPPING, SLOWING, OR OTHERWISE LIMITING THE SPREAD OF A PANDEMIC TO THE UNITED STATES**
- 2) **LIMITING THE DOMESTIC SPREAD OF A PANDEMIC AND MITIGATING DISEASE, SUFFERING, AND DEATH AND**
- 3) **SUSTAINING INFRASTRUCTURE AND MITIGATING IMPACT TO THE ECONOMY AND THE FUNCTIONING OF SOCIETY.**

Classification, Predicted Mortality & Mitigation

Inter-pandemic phase New virus in animals, no human cases	Low risk of human cases	1
	Higher risk of human cases	2
Pandemic Alert New virus causes human cases	No or very limited human-to-human transmission	3
	Evidence of increased human-to-human transmission	4
	Evidence of significant human-to-human transmission	5
Pandemic	Efficient and sustained human-to-human transmission	6

SOURCE: WHO

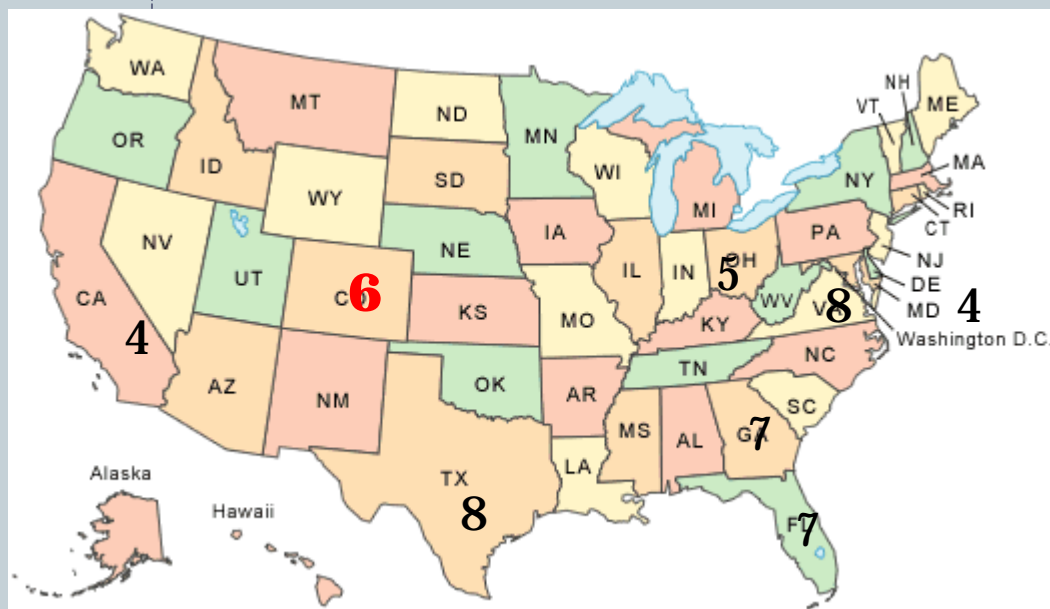
Indicates current status



Ready or Not? 2006 Report

- **15 states will provide**
 - emergency vaccines, antidotes, and medical supplies from the **Strategic National Stockpile**.
- **25 states would run out of**
 - **hospital beds** within two weeks of a **moderate pandemic flu outbreak**.
- **40 states face a shortage of nurses.**
- **13 states** show declining rates for **vaccinating seniors for the seasonal flu.**
- **11 States and D.C.** lack sufficient capabilities to **test for biological threats.**
- **4 states** do not **test year-round for the flu**

- **6 states** cut their **public health budgets** from fiscal year (FY) 2005 to 2006; the median rate for state public health spending is \$31 per person per year.



National Guidance, Legislation and International Considerations



Select Guidance and Legislation Framework & Budgetary Realities



1. **NATIONAL STRATEGY FOR PANDEMIC INFLUENZA IMPLEMENTATION PLAN (MAY 2006)**
2. **PANDEMIC AND ALL HAZARDS PREPAREDNESS ACT (DECEMBER 2006)**
3. **OSHA GUIDANCE ON PREPARING THE WORKPLACE FOR AN INFLUENZA PANDEMIC (FEBRUARY 2007)**
4. **CDC GUIDANCE FOR TRAVEL (UPDATED JULY 2007)**

The 12 ESFs



Transportation
Department of Transportation



Communications
National Communications System



Public Works and Engineering
Department of Defense/U.S. Army Corps of Engineers



Firefighting
Department of Agriculture/Forest Service



Information and Planning
Federal Emergency Management Agency



Mass Care
American Red Cross



Resource Support
General Services Administration



Health and Medical Services
Department of Health and Human Services



Urban Search and Rescue
Federal Emergency Management Agency



Hazardous Materials
Environmental Protection Agency



Food
Department of Agriculture/Food and Nutrition Service



Energy
Department of Energy

ESF- 8 Functional Areas

1. Assessment of Health/Medical Needs
2. Health Surveillance
3. Medical Care Personnel
4. Health Medical Equipment and Supplies
5. Patient Evacuation
6. In-Hospital Care
7. Food/Drug Medical Device Safety
8. Worker Health/Safety

2007 Fiscal support to the states (\$ 896.7 Millions)



1. **\$175** million for preparedness to assist public health departments in *planning* efforts.
2. **\$57.3** million to support the Cities Readiness Initiative (CRI). CRI is designed to ensure that selected cities provide **oral medications** during a public health emergency to 100 percent of their affected populations.
3. **\$35** million to improve the **early detection, surveillance, and investigative** capabilities of poison control centers to provide information to health care providers and the public to respond to **CBRNE**
4. **\$5.4** million is specifically allocated for states bordering **Mexico** and **Canada** (including the Great Lakes States) for the development and implementation of a program to provide **effective detection, investigation, and reporting** of urgent infectious disease cases in the three nations' shared border regions.

Total \$ 7 Billions since 2002

Border Control



- USDA inspects and tests all birds (not CANADA)
- Capacity for 30 days quarantine and testing for AI
- Prohibition of import of poultry from areas affected by A I
- International assistance
- Vaccines
 - Create Firewall around quarantine areas
 - 40 million doses (H5 and H7 as 50/50)
- 39 Labs
- **2006 Supplemental \$91 millions**
- **2007 additional \$81 M**

Progress report for 2006-2007



U.S. engaged more than 100 countries through WHO

- **Trained more than 129,000 animal health workers and 17,000 human health workers in H5N1 surveillance and outbreak response.**
- **Deployed over 300,000 personal protective equipment kits to more than 70 countries for use by surveillance workers and outbreak-response teams.**
- **Provided technical expertise to national investigations of actual outbreaks of H5N1 in countries on three continents and provided technical assistance, commodities, and logistical or financial support to 39 of the 60 countries and jurisdictions affected by H5N1.**
- **Support efforts to improve laboratory diagnosis and early warning networks in 75 countries.**

U.S. is working on a Global Scale

- **Creating the Wild Bird Global Avian Influenza Network for Surveillance project;**
- **Enhancing the Global Emerging Infections Surveillance and Response System;**
- **Funding the World Health Organization Global Outbreak Alert and Response Network;**
- **Expanding the network of Global Disease Detection Centers; and**
- **Providing the genome sequences of more than 2,250 human and avian influenza isolates as a result of the Influenza Genome Sequencing Project to track genetic changes in viral strains.**

White House Report Card Released on July 17, 2007



Improve Pandemic Preparedness

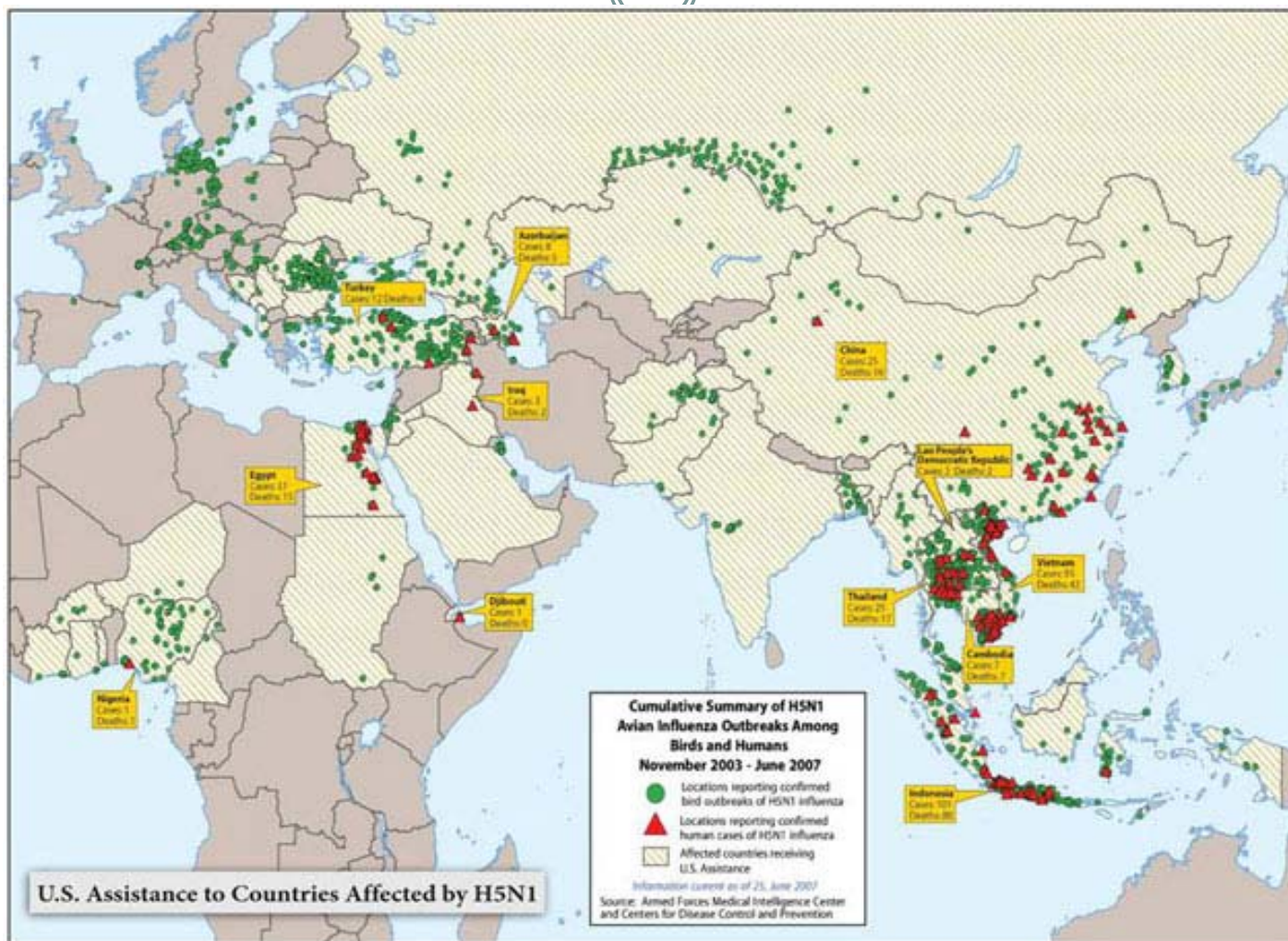
- Enhance
 - National and global surveillance
 - International coordination
 - Layered border measures
 - Rapid diagnostics and care
 - Stockpile medical materiel
 - Sustenance of government services, CI and CO
 - Communications

Reduce Impacts of Disease Spread

- Personal hygiene
- Use of face masks
- Community measures
- Vaccine production, efficacy and stockpile
- Stockpile antivirals
- Educational campaigns

2005 request \$6,7 Billions
Supplemental. Funding appropriated in
three installments (2008) + \$5 Billions
for compensation to vaccine use

Accomplishment 2007 Report



HHS



- FY 2007 outlays will total \$698 billions, an increase of \$58 billions over FY 2006.

- Transform the Healthcare System;
- **Secure the Homeland;**
- Modernize Medicare and Medicaid;
- Advance Medical Research;
- Protect Life, Family and Human Dignity; and
- Improve the Human Condition Around the World.

Evidence of Surge in Past Events

#Patients in ED

- **Tokyo 1995, Sarin Gas subway release**

984 patients hospitalized;

4023

1:5 ratio

- **NYC 2001, World Trade Center collapse**

139 patients hospitalized (5 hospitals);

790 evaluated in
first 48 hrs

1:15 ratio

- **Northern VA (Inova Fairfax) 2001, Anthrax**

2 confirmed inhalation anthrax cases;

1,127

1:500 ratio

Surge Assumptions

- Healthcare facilities will stand alone for 48-72 hours prior to resupply from SNS
- No forward movement of patients possible in initial 72 hours; only limited re-distribution of patients to available medical resources likely (even less likely if 'contagious')
- Delivery of surge demand care will be needed *in addition to* delivery of basic services (e.g. labor/delivery, dialysis, cardiac, etc.)

Surge Definitions

“Lives that hang in the balance.”

- Healthcare facility surge

20% of staffed beds (expedite discharges, cancel electives)

- Community surge

Alternate Care Facilities (Federal, state and community)

- Public Health surge

Mass medication/vaccination & distribution

Requires capability, not just capacity

- Courtesy Dan Hanfling

False Planning Assumptions



Hospitals will receive prompt notification after disaster occurs.

Communications from disaster site to hospital occurs in less than 1/3 of cases [EL Quarantelli, 1983]

When communications do occur, exchange frequently does not include critical information

Many hospitals learn about disaster from mass media, arriving casualties or EMS arrivals, rather than from official sources

False Planning Assumptions



Responding EMS units will triage victims, provide stabilizing medical care, and then distribute casualties evenly so that no one hospital is inordinately overloaded.

Majority of disaster casualties are not transported by ambulance, and are not under control of EMS system.

JCAHO Guidelines and Emergency Management

Fundamental assumption:

Disaster plans alone are not effective unless they are supported by people and a process brought together by good management skills.

Will it happen?



Pros

- H5N1 is established in wild and domesticated poultry since 1997
- Spread from the Far East to Africa and Europe
- Several new (drifts) strains identified
- Affects both birds and mammal
- Detected in humans

Cons

- Virus infectivity of wild birds has been decreasing
- Has not demonstrated significant affinity for human receptors
- Aggressive containment and interdictions appear to work

Policy Issues

Who shall live . . .

**When not all can
live?**

Who should die?

- **Choices**

- **Individuals**
- **Community/Society**
- **Economy and
Security (CIP)**

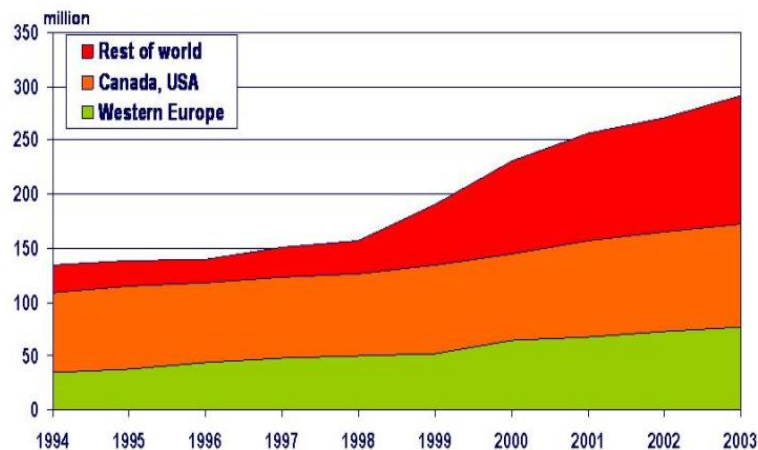
PANDEMIC INFLUENZA: COUNTER MEASURES



- **Federal plan (\$6.7B)**
- **Therapeutic**
 - Vaccines (\$4.7B . . . cell-based technology)
 - Antivirals (\$1.4B . . . Oseltamivir stockpiling)
- **Nonpharmaceutical**
 - Infection control
 - Social separation
 - ✦ Distancing
 - ✦ Isolation
 - Quarantine

JAMA 2006;295:554

Number of influenza vaccine doses distributed in various regions 1994-2003



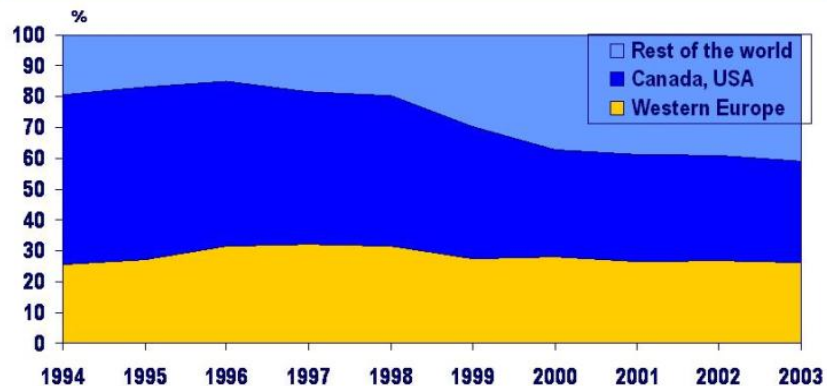
References:

1994-99: Dr David Fedson

2000 -2003 Influenza Vaccine Supply Task Force and WHO *Weekly Epidemiological Record* No. 40, 2004, 79, 357-368

WHO Global Influenza Programme

Ratio of influenza vaccine doses distributed by region 1994-2003



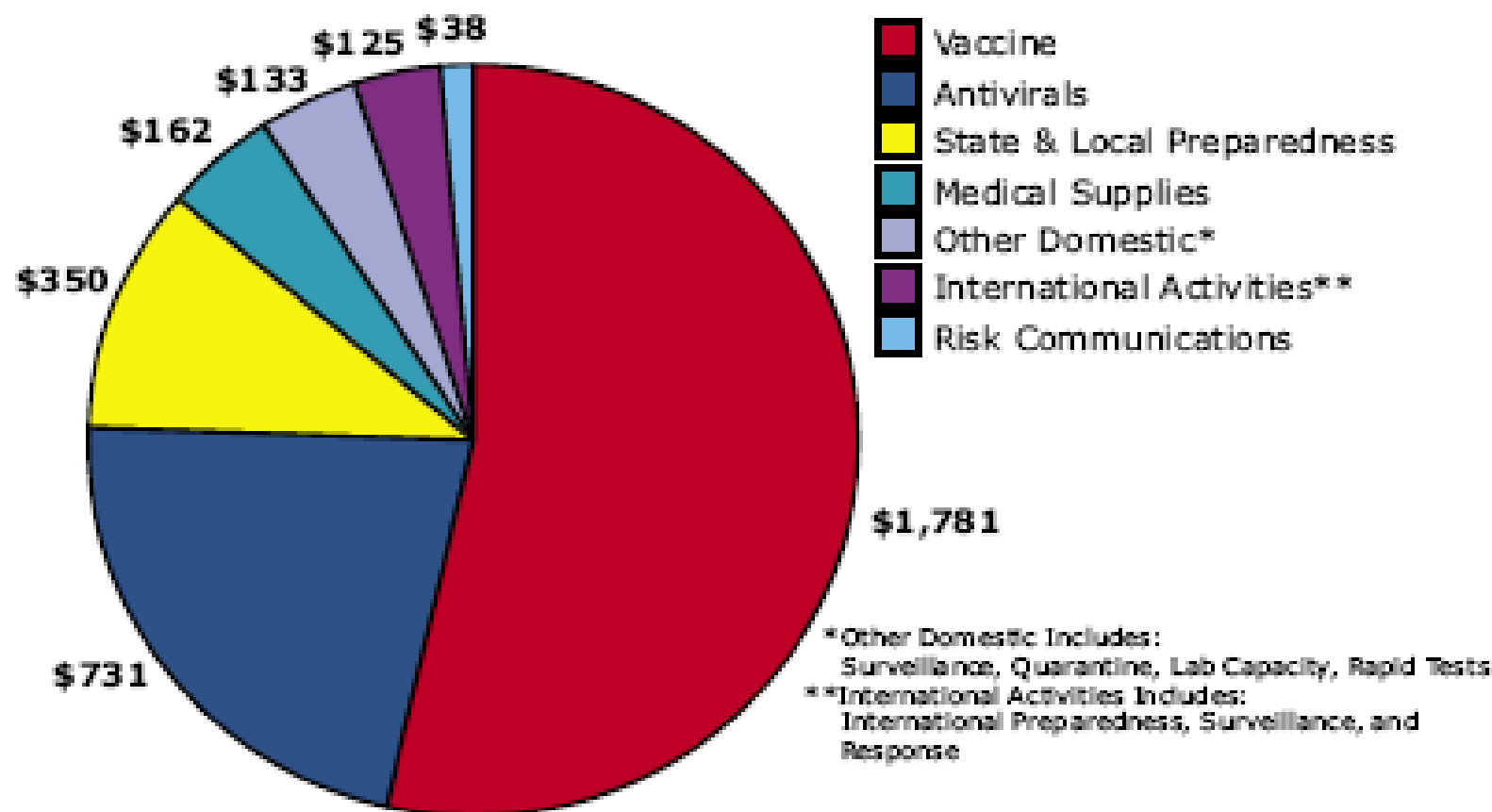
References:

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WHO Global Influenza Programme

**Pandemic Influenza Plan Funding
2006 Appropriations: HHS Allocation (\$3.3B)
(Dollars in Millions)**



CDC Assumptions for Procurement of Vaccine

Categories

Needs (2 doses/individual)

- Option A
- Option B
- Option C
- Option D

- Availability of Vaccine at current level (77.4 million vaccines about 25% of population)
- Additional 20 million (99.2 M.)
- 40% of the U.S. population(106.1 M.)
- 60% U.S. coverage (159.2 M.)*
* Saves most lives

Adapted from Martin Meltzer et al. CDC 2006

USDA Recommended Practices

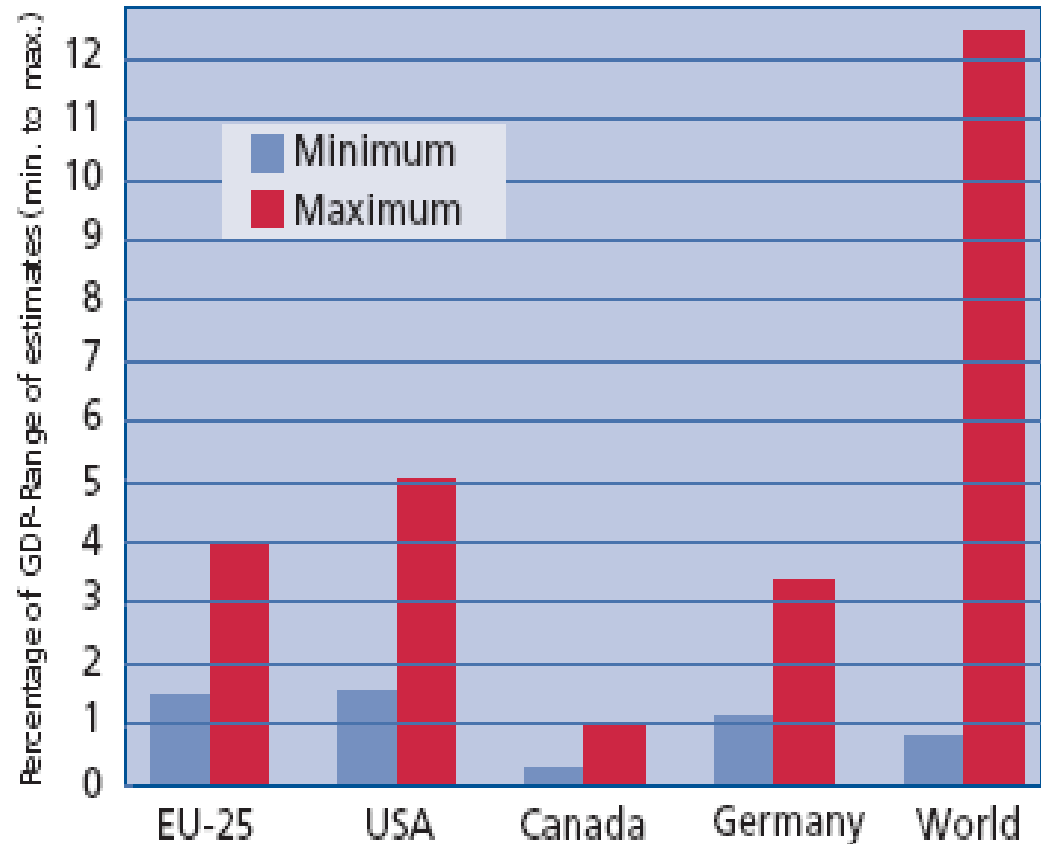
- **Biosecurity (sanitary)** practices are part of daily operations at commercial poultry farms
- **Commercial poultry are typically raised in covered buildings** – offering limited exposure to wild birds
- **Most commercial operations control access** to and from those buildings and require workers to follow sanitary procedures as they come and go
- **The U.S. commercial poultry industry is highly consolidated** – meaning many birds in close, confined locations – so it would be easier to wipe-out the virus

- **National Animal Health Emergency Reserve Corps**

Issue: Integration of Human and Veterinary Medicine training and practice

European Commission

The study assumes a morbidity rate of 30% and a mortality rate of 2.5%. On average, those infected would take three weeks off work. That translates to some 150 million Europeans becoming ill, and 3.75 million of those dying (or 7.5 deaths per thousand of the European population)



WMA Recommendations




- WHO is responsible for coordination and establishing levels of pandemic escalation
- National Governments will lead the implementation efforts. ***National physicians should be involved in the planning and response***
- **General principle to be followed**
 - ✦ The prioritization of one or two goals for the nation's pandemic planning is essential. Depending on these goals, the prioritization and use of vaccines and antivirals will vary:
 - A goal of reducing ***morbidity*** and ***mortality*** will have very different planning criteria from a goal of ***preserving societal infrastructure***.
 - Nations needs will be determined on ***basic assumptions*** about the severity of the pandemic. (**Consultation with other nations on priority setting required**)

Impediments to Hospital Disaster Planning

- Disaster response is mistakenly viewed as an extension of daily emergency response
- Disaster events *are considered low probability occurrences*
- Significant competing financial priorities
- Assessment of risks posed by potential disasters and determining the benefits of disaster management efforts are difficult to quantify

What remains to be addressed

- 
- Absenteeism in health sector
 - Continuity of operations in the critical service and manufacturing areas
 - Uniformity of the protocols among states
 - Private health sector incentives (reimbursements, insurance, etc.)
 - Continuity of health care and supporting services
 - Health Care Providers reciprocity credentialing
 - Supplemental legislation for mandatory vaccination of potential vectors for the virus
 - Good Samaritan liability coverage vs Federal Coverage under the uniform physician and HC personnel protection
 - Knowledge base on the epidemiology, transmissibility, efficacy of countermeasures, antivirals and vaccines in different population sub-groups.
 - Handling PTSD and violence
 - Allocation of scarce resources in the early phases of pandemic
 - Better guidance for continuity of operations

Influenza Pandemic and HC Action Plan



- Know clinical and epidemiological features
- Teach your colleagues, management & stackholders
 - Have a pandemic plan
 - Have antivirals and protective equipment
 - Be cognizant of the threats of microbial resistance
- Be prepared to lead
 - Confirm the diagnosis
 - Get the virus
 - Get a lot of help, fast

Haddon Matrix for Preparedness



Factors Phase		Human	Agent or Vector	Physical		Socio- Cultural
Pre Event						
Event						
Post Event						

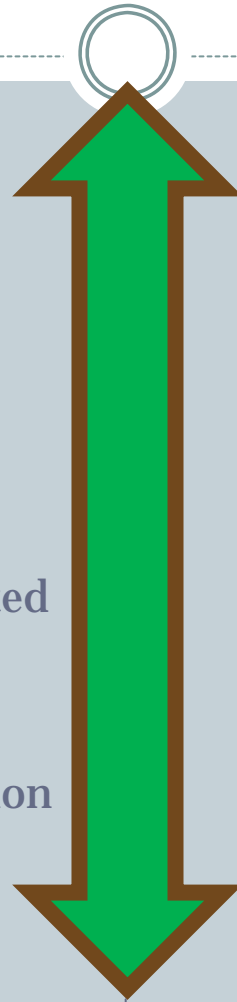
Conclusions

- **Risk Assessment**

- Probability
- Severity
- Consequences
- Uncertainties

- **Risk Management**

- Epidemiological and Scientific Evidence
- Formulation of Preventive Strategies based on the Integrated Risk
- Policy Formulation based on evidence+ risk
- Public and Professional Education and Risk Communication
- Informed Media Involvement
- Continuous monitoring and planning



The Road Ahead



Resources for Clinicians



- www.cdc.gov
 - U.S. public health guidelines
- www.pandemicflu.gov
 - U.S. pandemic plan
- www.who.int
 - Global updates and official case reports
- **More coming**

Additional Resources



[*Guidance on Preparing Workplaces for an Influenza Pandemic:*](#)

guidance and recommendations on infection control in the workplace, including information on engineering controls, work practices, and personal protective equipment, such as respirators and surgical masks.

[*Guidance for Protecting Workers against Avian Flu:*](#) information for protecting employees who may have been exposed to avian influenza.

[*Cover Your Cough:*](#) flyers and posters showing ways to reduce transmission of respiratory illnesses.

[*Stopping the Spread of Germs at Work:*](#) basic precautions for protecting employee health.

[*Quick Cards for Employees to Protect Yourself from Avian Flu:*](#) general precautions and specific information for poultry employees, laboratory employees, animal handlers, food handlers, and [healthcare workers](#)